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The American Biology Teacher

MARCH, 1959 VOLUME 21, No. 3

Co-Editor Richard Armacost

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Cover Photograph

This is one of the latest photographs taken of Professor Richard Armacost. It is used through courtesy of the Lafayette Courier-Journal with whom he worked closely in Science Fair activities.

THE AMERICAN BIOLOGY TEACHER

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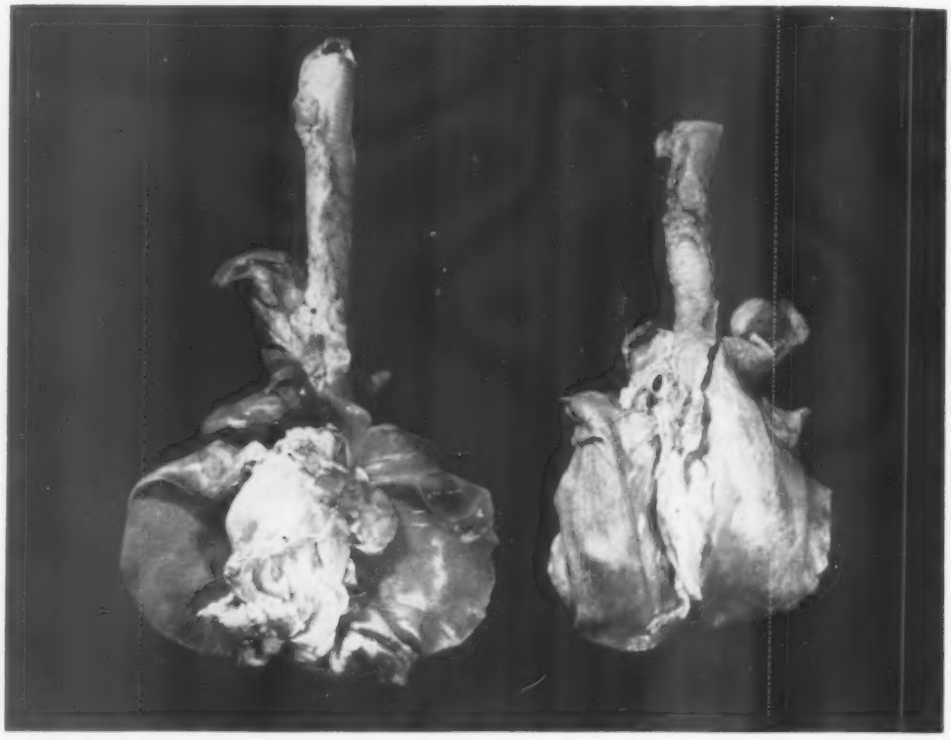

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RICHARD RALPH ARMACOST

February 27, 1914 - February 26, 1959

Those who knew him well will understand why this must be written in a personal way. Dick's personality caused an immediate reaction in each person whom he met. A few reacted negatively, but most responded in an amazed, unbelieving way to its force. He pulled no punches. His opinions were trenchant. But at all times, whatever he had to say was said with a keen and quick wit which took off in directions that left many of his listeners in gasping surprise and made his friends and acquaintances rock with laughter. What a void there will be in the lives of his friends!

I was awakened Thursday night, February 26, 1959, by a telephone call from a former student, a State Police trooper who investigated the fatal accident involving Dick. He knew of our friendship. And then began the inexorable machinery which death sets in motion.

Dick was heading for Indianapolis from Lafayette and swerved to avoid a car making a left turn. His car hit the berm which threw it out of control, sending him into the side of a truck approaching from the opposite direction. Death was instantaneous.

A native of St. Bernard, Ohio, he was the son of Mr. and Mrs. Charles Armacost. He received his A.B. degree from Miami University in 1936, an M.S. in 1938, and a Ph.D. in 1940 from Iowa State University. For ten years he served as an Associate Professor of Biology at Syracuse University where he taught various phases of botany, human genetics, and teacher education. While at Syracuse he developed a new course to improve the teaching proficiency of graduate students, was one of the authors of the General Science Handbook of the New York State Education Department, and served as President of the New York Science Teachers Association in 1942-43.

Dick came to Purdue University in 1950 as an Associate Professor and was promoted to full Professor two years ago. There he held a joint appointment in the Department of Biological Sciences and the Department of Education. His responsibilities at Purdue were broad, including classes in general education biology and biology teaching methods, Science Fair director, radio and television programs in biology, student programs, NSF Summer Institutes, and coordination of biology in the Purdue Extension Centers. He developed a Biology Teachers Workroom which was open the year around for teacher use. In addition, he edited the Welch Biology and General Science Digest.

His long list of publications range from technical articles in botany to study guides and syllabi in the sciences. He has appeared in many national meetings as a speaker, consultant, and section chairman. His memberships in professional organizations were numerous including the Botanical Society of America, NSTA, NARST, and NABT.

Survivors include the widow, Mrs. Katherine Armacost; two daughters, Miss Betsy R. Armacost, at home, and Miss Susan Armacost at Syracuse, N. Y.; and the parents, Mr. and Mrs. Charles Armacost of Cincinnati, Ohio.

I became acquainted with Dick about eight years ago through his work at Purdue University involving high schools. It was not long before a close friendship was formed. In 1954 when it was obvious that my teaching schedule did not permit me to continue as editor of ABT, the Board of Directors of NABT offered the post to Dick. Much to my embarassment, he refused the post unless both of us would act as Co-Editors. This the Board accepted. And then began a tumultous and never dull existence as a Co-Editor with Dick. We often disagreed, but differences were always resolved amicably and without bitterness. Our lines of responsibility were always clear to each other but seldom to the outsider. In every sense we were a team. No longer will I received communications signed "Coo-Editor" or "A Friend" with the "r" crossed out.

Several years ago we began our collaboration on a biology text with Prof. Clarence Goodnight of Purdue. It is scheduled for publication soon by Scott-Foresman Company. Dick acted as "our leader," and negotiations

and work with each other and the publisher were a continuous round of humor, good times, hilarity, and hard work for he knew the meaning of that too.

His puckishness, deviltry, and love of practical jokes drew out the same characteristics in his friends. Life with him seemed to be continually moving at a terrific speed. Thus it seems paradoxical that his quiet, gentle side was one of his strong features. He knew unhappiness. He loved flowers and little children. The opportunity was seldom missed to detour or take the time to enjoy them both. He abhorred cruelty and reacted with bitterness when this turned up in people. He plunged into the work of the youth program of the Elks with enthusiasm, devoting a great deal of time in making children happy. These are characteristics which will make his family miss him keenly.

One of his delights was to ridicule pretense no matter what form it took. And I suppose this is the key to all great humor. This was probably a fundamental trait of Dick which earned for him the friendship of many people and the enmity of a few. I can barely resist the temptation to tell how much I shall miss his personality, his advice, his encouragement —and, yes, his devastating humor. But there are many other friends at Purdue, the Elks, in NABT, and throughout the country who may say the same thing. Now we will enjoy recounting our stories about Dick and delving into a wealth of reminiscences that will make us happy for many future hours. And the well of loneliness for some of us will be less deep and dark.

CO-EDITOR
March 2, 1959

Bacteriology for Teachers of Biology

The Department of Bacteriology on the Bloomington Campus of Indiana University will offer during the summer of 1959 three courses of possible interest to teachers of biology. Each of these courses will be offered for graduate credit and previous training in bacteriology will not be prerequisite for enrollment. Rather the courses are designed for those who have had training in general biology but no courses in microbiology. A lecture course (T500—Principles of Bacteriology, for 3 credits) and the optional 2 credit laboratory course (T505) will be offered during the regular summer session (June 10-August 7). A special Bacteriology Workshop for Biology Teachers will be offered for 2½ credits during the period June 15-July 1. Enrollment in the laboratory course and the workshop will be restricted and those who contemplate enrollment should make application to Professor L. S. McClung, Chairman, Department of Bacteriology, Indiana University, Bloomington, Indiana, by May 1. Professor McClung will be in charge of the workshop and Professor W. A. Konetzka will be in charge of the courses during the regular summer session. If arranged in advance, concurrent registration will be permitted in the workshop and the regular session courses with the total of 7½ graduate credits. The registration fee for all courses will be $9.00 per credit hour with no additional fee for out-of-state residents. In all of the courses, special stress will be given to the use of microorganisms in the illustration of fundamental biological phenomena.

The Unknown Has Been Identified

The cover picture in the February issue has been identified as having been taken by Mr. Russell Pengelly, Klamath Falls, Oregon. The picture was taken with a 2¼ by 3¼ Speed Graphic. We knew that someone would claim this beautiful picture.

A new booklet designed to aid biology teachers in selecting the apparatus and supplies needed for modern courses in secondary school biology has been published by Central Scientific Company. The new 20-page bulletin contains recommendations for student apparatus, general and demonstration apparatus and supplies.

Suggested subjects include use of the microscope, projector and microprojector, and microtome; preparation of microscope slides; structure of simple organisms; study of plants and animals; the human anatomy; and many others. Copies may be obtained free of charge by writing to Central Scientific Company, 1700 Irving Park Road, Chicago, Illinois. Ask for Bulletin B-9.

Advanced Placement Program in Biology*

WILLIAM S. PUTNAM
St. Louis Country Day School, St. Louis, Missouri

The special features of the Advanced Placement Program are most easily understood in the light of its history. I propose therefore to discuss the origins of the program, then to describe its present operation, and finally to describe some aspects of courses that will prepare students as candidates for advanced placement. There are a number of features of the Advanced Placement Program which distinguish it from even the best of enriched or advanced biology courses which have been developed by able and conscientious teachers in our schools. At times I may sound a bit like the Church of England clergyman who was patronizing a fellow minister of another Protestant group. His words were, "We each serve the Lord in our fashion, you in yours, and I in His." Please bear with me if this seems to be the case, but it is important to realize that no similar program has been developed which can claim the active participation of so many highly qualified teachers of biology.

The origins of the Advanced Placement Program can be traced from two main roots. One of these roots was The School and College Study of General Education. Three schools, Exeter, Andover, and Lawrenceville, and three colleges, Harvard, Yale, and Princeton, were associated in this study. They received financial support from the Fund for the Advancement of Education and did most of their work during 1951. Among a variety of interesting ideas, this group paid special attention to the waste of time, lack of stimulation, and weakening of study habits that result when able, well taught students repeat (during the college freshman year) courses that were thoroughly studied in preparatory schools. One of the solutions suggested was the creation of a special program for the most able and highly motivated students making possible the completion of both preparatory work and undergraduate college work in a seven-year period. There was the usual disagreement about which institution, the school or the college, should have the student for four years and which should have him for three. The committee however concluded that where strong secondary schools were involved the student would profit most from four years in school with three in college. Acceleration then would depend on doing sufficiently advanced work in the secondary school to anticipate much of the freshman year program. Of course, a central problem here was to identify which students could profitably skip all or a portion of their freshman courses. To this end the members of the study proposed the creation of a series of advanced placement examinations designed to supply independent evidence to the colleges of the student's achievement in a variety of subjects.

At the same time that the three school-three college study was carrying out its deliberations, Gordon Chalmers, the late President of Kenyon College, was in the process of organizing a considerably larger group of colleges and schools into a study which also was concerned about the wasted time for able students in our traditional academic lock step. The Chalmers group began their study with four opinions or prejudices which in Chalmers' own words were:

1. "For the bright student who is well taught the American system wastes time.
2. The best place for a school boy is in school.
3. The best teachers of seventeen-year-olds are as likely to be found in schools as universities.
4. The increase of professions depending on graduate work and the necessary extension of graduate training for doctors, engineers, scholars, scientists, lawyers, ministers, and businessmen puts increasing emphasis on efficient use of the years available for study. Added to these opinions about American education and American students is an assumption about mobilization; that for many years to come young men will have to devote at least two years to military service."

*Presented at an NABT session of the AAAS meetings in Washington, December, 1958.

It will be worthwhile I think to examine these prejudices for a moment. These ideas were developing in 1950 and 1951. You will perhaps remember that the Ford Foundation at that time was supporting with full scholarships a program of early admission to college. Yale, Chicago, and one or two other universities were involved in this program. The general idea was that exceptionally bright high school juniors could skip their senior year and plunge into the college freshman year.

Mr. Chalmers was an effective spokesman for many of us in schools and colleges who were strongly opposed to this plan. Hence the Chalmers plan which involved:

1. Assembling a group of colleges that would cooperate in an experimental program: There were: Kenyon, MIT, Bowdoin, Brown, Carleton, Haverford, Middlebury, Oberlin, Swarthmore, Wabash, Wesleyan, and Williams.
2. Getting these colleges to agree on what constitutes sound freshman level work in the subjects most frequently taught to freshmen.
3. Rounding up a group of exceptional secondary schools (public and independent) which would be willing to try these intensive courses with some of their ablest students.

After the necessary spade work a Central Committee was formed and the plan named, *The School and College Study of Admission with Advanced Standing*. The project was launched with an initial grant of $50,000 from the Fund for the Advancement of Education of the Ford Foundation. The Central Committee was composed of the President or other top official of each of the participating colleges plus ten or twelve men who were principals of first-rate high schools or headmasters of fine independent schools.

The Central Committee agreed on eleven subjects which are commonly taught to freshmen and assembled a subject-matter committee for each.

This was my first direct contact with the study as I was one of seven named to the Biology Committee. Four of the committee members were heads of college Biology departments: from *Williams*, Elbert C. Cole, from *Kenyon*, Maxwell Power, from *Wabash*, Willis Johnson, from *Carleton*, Thurlo B. Thomas. The other two were, like myself, secondary school teachers, W. E. Jones from Evanston High School and Shippen Willing from Germantown Friends.

This Committee in composition and procedure was typical of all the other subject-matter committees. We assembled course syllabi from each of the twelve colleges and with this as a basis worked out our own course syllabus—trying to arrive at a course which would be acceptable to all of the diverse colleges involved.

This work went on at meetings in New York and at various colleges through 1952 and 1953. By the beginning of the 1953-54 school year eighteen pilot schools and the twelve colleges were ready to try the experiment, and during this year the subject-matter committee developed examinations to be given in May 1954 to validate the students' performance.

There were about 530 students who tried the examinations the first year, ranging from 152 students trying English Literature to 21 students trying German. There were 65 biology candidates. The other subjects available were:

> English Composition, French, Spanish, Latin, Mathematics, Physics, Chemistry, the previously mentioned Literature, German, and Biology.

The participating colleges helped measure the validity of the examinations by having groups of their own freshmen take the tests which were being administered to the high school students. The initial experiment was believed, in the member schools and colleges, to be very successful, and both groups were especially impressed with some of the by-product benefits. We were pleased to find that when a teacher or school offers really advanced work in one course many other teachers in the school begin working to a higher standard. We were also pleased by the relationship and developing respect between the faculties of the schools and colleges. It seemed to all of us to be a very good thing for education in general and well worth extending.

To keep the experiment within bounds a limited number of schools and colleges were taken into the program for the following year. The Ford Foundation practice, as many of you know, has been to support an idea through its initial stages until, if sound, it becomes self-sustaining. They had given a number of sizeable supplementary grants to bring the project

to this point, but there is an obvious limit to this kind of support.

An arrangement was made between the Central Committee and the College Board for the latter to take over administration of the study. The present program began in the spring of 1955 when the College Board took over the study, calling it the Advanced Placement Program. It would be worth while now to stop and summarize some aspects of the Advanced Placement Program as it exists today. This is a special program under the CEEB with its own director who this year is Mr. Jack Arbolino, formerly of Columbia University. There is also a Commission on Advanced Placement which represents the views of the participating institutions.

I. The program maintains committees of *examiners* in each of the subject matter areas. Usually three of the examiners are drawn from the colleges and two are secondary school teachers. The present Biology Committee is composed of Willis Johnson, Head of Science Department at Wabash; Frank Carpenter, Chairman of Biology at Harvard; Ralph Freeland, Professor of Botany at Northwestern; David Schiff of Midwood High School, Brooklyn, New York, and myself. We prepare questions starting in September, circulate them among ourselves by mail, and then meet in mid November, usually in Princeton, to prepare an examination. A representative from the Educational Testing Service sits with each committee as a technical consultant to aid in the construction of the test. The completed test is subsequently mailed to each examiner for final checking.

The examiners are also responsible for revising the *course syllabi* and keeping them up-to-date. I cannot too strongly emphasize the importance of this activity. Many good schools and ambitious teachers have in the past organized honors courses or enriched their courses with materials beyond the high school level. Yet it has been nearly impossible for the colleges to recognize such work by placement or credit, because of the diversity of such courses and their usual lack of relevance to the college curriculum. Now, by use of a published syllabus, we can at least outline an advanced course which a school can teach if it wishes and a college can accept for credit if it thinks the course a sound one. Perhaps a course based on one of these syllabi is no better than one that you might develop by following your own special interests in biology, but it is a course that a great many college faculties have already considered and judged satisfactory.

II. The examinations are given in May of each year at centers which are set up across the country. A student registers for these tests as he does for College Board tests. A registration fee of $5.00 and an $8.00 examination fee is required of each candidate. At the same time the examinations are given to a small group of college students completing the corresponding course in their freshman year. In May 1958, 212 candidates in biology took the examination as did 25 college students.

III. *Readers* of the Advanced Placement Program assemble in June either in or near Princeton, New Jersey, and grade the examinations. The readers always include some of the examiners to provide continuity. This is slow work as from two-thirds to one hundred percent of each of the three-hour examinations is essay questions. The biology examination consists of one hour of objective questions (about 90) and four essays of one-half hour each. There is usually some choice of essay topics. The college papers (the so-called "point of reference" group) are read at the same time and are not distinguishable from the high school papers. After the papers are graded the college papers are identified, and as we know the course grades of these college students, their papers can be used to decide if grading standards are stiff enough or too rigorous.

IV. Reports to Colleges.

Each candidate's tests are retained until mid-summer when his college choice is certain and then mailed with his grade to the college he will enter. The college also receives a written description of the course the candidate has had and a formal recommendation from the candidate's high school. The test papers are retrieved from the colleges after the decisions have been made and sent back to the schools for the edification of the teaching staff. It

is usually November before this takes place. You will note that the college faculty has a lot more data than a test score to help them decide on the candidate's suitability for advanced placement.

V. Conferences, however, are one of the most significant of the Program's activities. Each June conferences are arranged in each subject area as well as an administrators conference. Last June about 700 school and college teachers and 100 school and college administrators met. It is these meetings that have had much to do with the success of the program to date. The college people lost some of their suspicion that secondary schools are places where very little of intellectual significance takes place. The secondary teachers were able to discuss first-hand just what is involved in the college level courses they were trying to supplant. The growing trust and understanding between the schools and colleges concerned is one of the main dividends of the program.

A large and growing number of colleges (more than 361 at the last count) are recognizing the program and giving advanced placement to students on the basis of these examinations. Many, though not all, also grant college credit to successful candidates.

What does the program entail for the interested school?

First—Special classes of exceptionally able *and* ambitious students must be organized. These are almost of necessity small classes.

Second—A first-rate teacher must be given extra time to organize and prepare the advanced course.

Third—Advanced texts, reference materials, and special equipment must be purchased. The student does more work and more demanding work all year and he must invest a substantial examination fee.

As you can see each of these adjustments costs money but the rewards in academic tone alone are enough to justify the expense.

What, then, are the special characteristics of the Advanced Placement course in biology? As you will all see when you read the syllabus published by the College Board the biology course is a reasonably traditional survey course built around the two unifying concepts of evolution and ecology. You will detect some obvious differences from the usual high school course in the greater stress on the invertebrates, the greater depth specified in the study of genetics, etc., but on the whole you may conclude that this course differs little from one following a good high school text such as that by Moon, Mann, and Otto. It is very difficult, I think, to produce a syllabus sufficiently detailed to give a real idea of the necessary depth of coverage without at the same time being so minutely specific that the instructor feels hemmed in by the syllabus. Perhaps some of the essay questions from previous years will be helpful in this connection:

1. Give an orderly informative account of the occurrence, function, and importance of surfaces in biological systems.
2. Describe the general pattern of alternation of generations as it occurs in the vascular plants. Outline, using diagrams, the gametophytic generations of ferns, angiosperms, and one intermediate type.
3. The terrestrial types of invertebrates have been derived from more primitive aquatic types. Describe the changes that have taken place in respiratory mechanisms during this environmental shift. Also give an account, with two examples, of respiratory adaptations which have occurred in typically terrestrial invertebrates that have become aquatic again.
4. Enzymes have been defined as "organic catalysts" and as such play a dominant role in metabolism.
   A. Discuss
      (1) The chemical nature of enzymes.
      (2) How they are believed to catalyze chemical reactions in protoplasm.
      (3) How they are believed to be produced within protoplasm.
   B. Discuss three basically different types of chemical reactions which are catalyzed by enzymes.
5. Describe the pathway followed by a given molecule of water through a plant having primary tissues only (i.e., no cambium) from its source in the soil to its ultimate destination. Describe two events that could possibly occur to the molecule of water anywhere along the pathway and relate these events to the metabolism of the plant.
6. Discuss the role of genetic discoveries in providing a better understanding of evolution. Include in your discussion both classical genetics and population genetics.

What are some practical solutions to the problems of offering a course of this caliber to high school students? The assumption that as biology teachers we are sufficiently well grounded in our subject to teach a course equivalent to that offered in many colleges is no small one. As you know many colleges split up the lecture responsibilities. Botanists, invertebrate zoologists, embryologists, geneteticists, etc., will cover the appropriate portion of the course. Lacking this variety of resources, the secondary school teacher must make strenuous efforts to stay up-to-date. If you had your biology training as long ago as I did, it was probably a shock to discover such things as a segmented mollusk or the existence of sex in bacteria.

Then you need highly motivated and able students with enough maturity to understand a difficult college text. They should have some background in physics and/or chemistry, or failing this, they should have completed an elementary biology course. Some schools solve this by opening elementary biology to able freshmen, teaching physics and chemistry in the next two years, and offering a choice of advanced sciences for seniors. Others have been successful by offering two successive years of biology. Given exceptional students and small classes, the job can be done even without these helpful adjustments in the curriculum. In my own school during the past few years we have had very successful candidates with one year of biology being the only science since an eighth grade course in general science. Most of these candidates were tenth grade students rather than juniors or seniors. However, this has been possible, I think, only because class sections have ranged from six to a maximum of thirteen. It also means that the first three or four weeks of the course must be devoted to elementary chemistry, learning something about valence, ions, the characteristics of carbohydrates, proteins, and fat, buffering, enzymes, and the like. I must offer one word of warning here. If a student is science-centered and at the same time inept in English, he will have trouble with the course. The vocabulary is part of the science and can become a terrible obstacle for the child who is a poor reader.

One of the major problems for most secondary schools is to develop a laboratory program comparable to that found in colleges of high standards. It is not just a question of microscopes, slides, incubators, autoclaves, etc., but it is also a question of time. I doubt if many of you can obtain your students for a two or three-hour uninterrupted laboratory period. I also doubt that many of you have the kind of laboratory assistance that can prepare nutrient agar, mix stains and reagents, feed the animals, and wash glassware while you devote your time to teaching rather than mechanics. In the present state of the world most of us have to be content with partial solutions of problems like these. Again, if I may refer to my own practice, it is helpful to keep the laboratory open at all hours. We have a little over an eight hour school day, and small groups of students are permitted to work in the laboratory without supervision whenever they are not committed by other appointments.

Textbooks are another problem. In 1954 the School and College Study of Admission with Advanced Standing published a list of eighteen textbooks then being used by the colleges in the study. They also published a list of about sixty titles which were commonly used as references or supplementary texts. The present program under the aegis of the College Board is unwilling to be in the dubious position of recommending specific textbooks. The proper solution, unless you already have a wide knowledge of college texts, is probably to seek advice from the biology faculties in the colleges which your students usually enter. It is worthy of note that the *Advanced Placement Program Newsletter* of last May warned against the selection of "softened" college texts being offered by some publishers, on the grounds that such texts would not be appropriate for this program, although they might be well suited for some enriched courses.

Teachers interested in knowing more about the Advanced Placement Program or in setting up such a program in their own schools can obtain advice and assistance from Mr. Jack N. Arbolino, the program director. It has also been our experience that members of college biology departments all over the country have been receptive and responsive to requests for help coming from the schools. Most teachers in the program find that they have greatly increased their work load, but none of them seem to mind. The students' enthusiasm for really demanding work has startled a lot of teachers and perhaps even

more administrators. Both students and teachers in this program have a feeling of pride and accomplishment that is all too rare in our educational system. The fact that advanced placement could make possible a shorter stay in college is of no significance to most of the students who have been through the program. What is significant is that they have earned time and opportunity to do still more advanced work in college. They have been permitted to develop at a rate which is relevant to their talents and they thrive on it. Admittedly the program is for the few, but it is a group that will have a disproportionally large influence on the future of science and of the nation. If we can keep alive a love of learning and a measure of intellectual drive in such students, no effort on our part will seem unreasonable.

Robin Roosts*

JOHN F. MEHNER
Mount Lebanon Senior High School, Pittsburgh, Pennsylvania

Large concentrations of birds flying to and from roosts provide one of the most spectacular sights that a biologist can observe while studying birds. When I was working on the life cycle of the robin (*Turdus migratorius*) in Pittsburgh, Pennsylvania, and in East Lansing, Michigan, from 1953 through 1957, I made some observations on roosting during the late summer and fall.

In the evening robins fly to roosting areas where they remain until early morning. During the nesting season only the male goes to a roost while the female remains on the nest. At this stage in the life cycle the males evidently leave the roost very early. On a visit to a roost in Urbana, Illinois, on June 17, 1941 at 3:35 A.M., Speirs (1946: 78) found the area being rapidly deserted by the robins. Later when the young are able to fly well, they also move to a night roost.

Before leaving their nesting territory or feeding grounds at night, robins exhibit considerable restlessness. They fly back and forth between the ground and perches in trees or on houses, often giving call notes. Sometimes they join other robins flying overhead. From one to two hours before sunset at a daytime communal feeding area in a wooded section at the edge of East Lansing, robins moved from a buckthorn (*Rhamnus frangula* L.) thicket through the eastern part of the woods to open areas beyond. I observed the same behavior at communal feeding grounds in Pittsburgh where they shifted to an adjacent golf course before repairing to the roost.

Abel (1914), Bailey (1932), Black (1932), Bolander (1932), Brewster (1890), Ganier (1924), Howell (1940), Pearson (1910), Speirs (1946), Stover (1912) and Youngworth (1929) describe roosts and/or roosting behavior, of which Brewster's account is the most complete. Most of these roosts were in wooded areas.

Robins commonly roost with other species of birds, especially starlings, grackles and cowbirds. I observed this in a residental section of East Lansing and in a woods directly north of Ingram, a suburb of Pittsburgh. A roost at Highland Park in the eastern part of Pittsburgh was composed almost entirely of robins.

I made observations at Ingram only in the late summer of 1953. Situated on a northern slope, the roost covered an undetermined portion of a second growth wooded area that was about one mile in length and one-fourth mile in width. There were many *Crataegus* thickets. The East Lansing roost covered somewhat more than six city blocks, with minor fluctuations. The birds passed the night in large shade trees that lined the streets. The one in Highland Park was a densely shrubby embankment of a reservoir plus adjoining wooded areas. The shrubs, largely mock-orange (*Philadelphus coronarius* L.), were from six to eight feet in height.

Figure 1 shows the flock size that Stanley Belfore and I recorded at the Ingram roost on two evenings in 1953. No attempt was made to count the total number of robins, since they were arriving from several directions. It can be seen that they arrived singly and in small groups, which were loose, straggling

*A contribution from the Department of Zoology, Michigan State University, East Lansing.

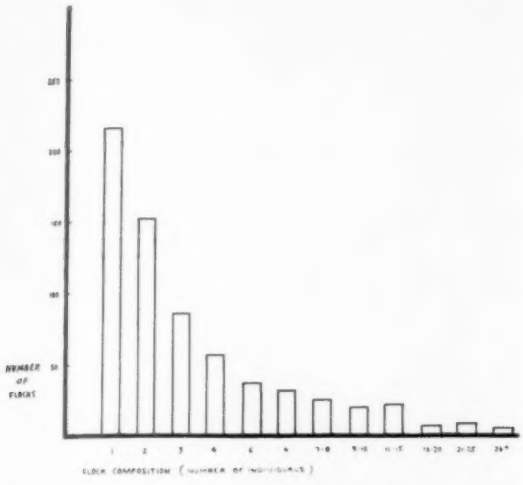

FIGURE 1. The composition of robin flocks arriving at the Ingram roost in Pittsburgh on the evenings of August 27 and September 11, 1953.

ones. The largest flock was composed of about 50 individuals. Likewise, most of the aggregations that Brewster (1890:369) and Stover (1912:170) observed were small. However, Youngworth (1929:105) records robins coming to a roost in groups ranging from 150 to 200. At two winter roosts, Bolander (1932:142) and Pearson (1910:208) describe some flocks as enormous.

On five clear evenings at the Highland Park roost robins flying into the area were counted, and at five-minute intervals the light intensity was measured with a Weston Master Lightmeter (Figure 2). Flying at 100 feet or more above the roost, the early arrivals descended toward the vegetation in almost vertical dives. Sometimes they went to the reservoir to drink or to the lawn to forage. With the advent of darkness, robins streamed into the roost in progressively larger numbers, sometimes five or six feet above the shrubs. Abel (1914:172) and Brewster (1890:370) made similar observations. Bernard Van Cleve's observation on January 15, 1956, indicates that robins may experience difficulty in finding the roost if they arrive after dark. He found about 10 robins fluttering about the guard rails of the reservoir. It is thought that they left their feeding grounds late, and that with the onset of darkness the ring of lights around the reservoir attracted them.

At the East Lansing roost the majority of robins arrived later than the starlings, grackles and cowbirds, which occupied the central part of the area. Consequently, robins were concentrated in the periphery. In the morning robins left first, and at daybreak many of them were on nearby lawns. Gradually they spread back to communal feeding grounds.

I am grateful to Dr. George J. Wallace for his helpful advice and for reading and criticizing the manuscript.

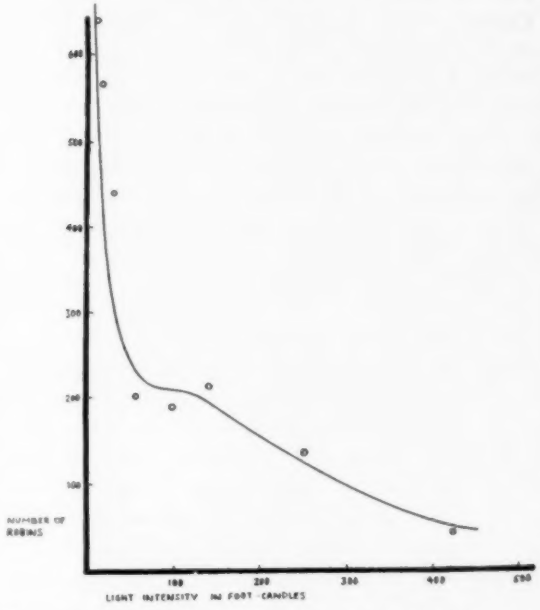

FIGURE 2. Arrival of robins at the Highland Park roost in Pittsburgh during five evenings in August, September and October, 1955.

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Outdoor Laboratory Series — No. 6

Preparing Teachers to Use Outdoor Laboratories

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The Pennsylvania Conservation Laboratory for teachers has been offered for the last thirteen years as a part of the summer session at Pennsylvania State University. It consists of two intensive three week courses for elementary and secondary teachers of the state.

The purposes of this course were set up by a State Advisory Committee composed of representatives from the supporting agencies. The laboratory program is designed to give Pennsylvania teachers the opportunity:

(a) To obtain information from first hand observation of the natural resources of the commonwealth.

(b) To understand the interrelationships between natural resources and between man and resources.

(c) To acquire a knowledge of the need for the conservation of natural resources for the continued welfare of the commonwealth.

(d) To understand how to maintain a favorable balance between man and the natural resources upon which he is dependent.

(e) To study practical methods of correlation of the various conservation education programs with actual present day teaching situations in the classrooms of the public schools.

(f) To visualize how conservation of natural resources must be a part of community life and state planning.

(g) To afford a co-operative opportunity for teachers to approach the study of conservation education in its various phases.

Teachers who participate in this laboratory are the recipients of a carefully planned program which is presented to them in a variety of ways. They are led to see that the teaching methods used for them can be taken back to the classroom and used effectively with their own students.

It all begins on a Sunday night after dinner. Students are registered and settled in dormitory quarters, and then invited to meet in the basement recreation room. After a period of introductions and informal conversation, the Director of the Laboratory discusses the purposes of the course and gives instructions about mail, laundry, first aid, clothing for field trips, and numerous other administrative details which are necessary for an enjoyable, smooth running program.

"Rock pickers" in action—looking for trilobites, brachiopods, etc.

The elementary consultant and the secondary consultant are on hand to explain how the group will be divided so that classroom work can be directed toward the grade levels of the teachers participating.

On Monday the consultants use the morning session to acquaint the group with the resources available in the classroom and elsewhere on the campus. Selected reference books, film strips, movies, and pamphlets are provided. Field collecting equipment and binoculars are also available. By the end of the day, the students have completed university registration and are "settled-in." They have been introduced to the topic of geology which will be the chief concern of tomorrow.

Observing the Weir Dam, used to measure stream "flow" on a watershed project.

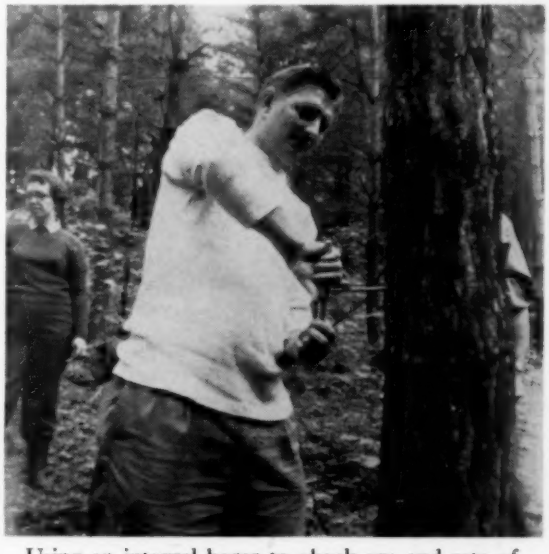
Technical knowledge in each phase of conservation is provided by visiting instructors. The daily schedules are arranged so that group sessions with the two consultants are interspersed among the lectures and field trips conducted by experts in each field. In this way the members of the class have an immediate opportunity to discuss ways of adapting what they have learned to classroom use.

For the sake of brevity we will discuss the activities in the course without clearly defining the daily schedule. There are many days which have three sessions between eight o'clock in the morning and eight-thirty at night. For this reason, the program must be varied and interesting. Otherwise the group morale would surely suffer.

The earth being the foundation for all resources makes geology a logical beginning. After a lecture on General Geology, and Pennsylvania Geology, and Mineral Wealth, by an instructor from the College of Mineral Industries, the group takes two geological field trips which give them an opportunity to study local formations and to collect rock and mineral specimens. One trip includes a visit to a soft coal strip-mining operation. All field trips are taken in a chartered bus. Box lunches are provided for all-day trips, and the visiting instructor supplements his lectures with "on-the-spot" discussions. The students are taught to identify the specimens collected, and during group discussions they have a chance to ask questions. During integration sessions they are encouraged to make practical lesson plans for their own use. This procedure is followed in each of the conservation topics included in the course.

The second phase consists of soil conservation lessons taught by a soil technologist and an agronomist borrowed from the College of Agriculture. Field trips at this time provide opportunities for collecting soil samples, testing soil characteristics, and observation of soil erosion test plots. A visit to a privately owned farm introduces the students to good soil conservation practices such as tile drainage, diversion terraces, grass waterways and proper land utilization. Students participate in such activities as mapping the farm and laying out contour plowing lines. Available soil conservation teaching aids are exhibited and explained.

Wild-life management is presented by means of a panel discussion conducted by an animal biologist and representatives from the State Game Commission. The game commission also sends movies, slides, and pamphlets which are exhibited and explained by their representative. A field trip to a near-by fish hatchery and research station acquaints the group with the propagation and research methods used by the Pennsylvania Fish Commission. For many, this is a first chance to see and handle large native species and new types of hybrids, such as the splake. Following this activity a state game biologist describes the current research being done in game management, such as the nutritional studies in connection with Pennsyl-



Using an integral borer to check age and rate of growth in this tree.

vania's deer herd. Included in the field trips is a journey to state game lands where food and cover experiments are underway. At the integration sessions the discussions by the consultants are slanted toward the idea of the interrelationships among tree, animal, and bird populations, and how good soil and adequate water supply help to determine the health of all living things. The concepts concerning renewable resources are also introduced in these discussions. Students are urged to consider the particular problems present in their own teaching areas, and to formulate plans which they can use in teaching or public relations work when they return.

After the problem of clean streams and adequate water supply is discussed by a representative from the Pennsylvania Sanitary Water Board, the group visits an experimental water-shed testing station. Here they become familiar with the equipment used to measure stream flow on a year-round basis. The problem of industrial wastes and sewage disposal are discussed. Again, attention is called to the problem of soil erosion and the deposition of silt in streams.

Three days of the workshop are spent in pursuing the answers to the problems of forest conservation and management. A university professor of forestry discusses current practices in forest management and guides an all day trip which covers various areas of experimental forests maintained by the university. Students see experimental growth plots, different types of natural forests, and also explore a wilderness area. They participate in practical elementary forest techniques such as goring a tree to check growth rings, pruning trees, identifying samples of sawed lumber, planting seedlings, and pruning Christmas trees. A local forester from the Pennsylvania Department of Forests and Waters helps to conduct the tours and also discusses current problems in state owned forests. A representative from the United States Forest Service speaks on federal practices and problems. A district extension forester describes the kinds of conservation aids available to a private land owner.

Examining a soil profile which shows A, B, and C layers of soil with a humus collection on top.

The last outside visitors to the class are three representatives from private industries such as paper mills and furniture factories. In a panel discussion they present the problems of forest conservation and management from their own viewpoints. The group begins to do some independent thinking when they see that private businessmen do not always see "eye to eye" with representatives from the state agencies. The fact that good game management for hunter's interests does not always result in good forest management for private companies is vividly pointed out to them. The field of conservation is so broad that different interests frequently overlap and in many cases result in conflict rather than cooperation.

In addition to the visiting faculty, the students themselves have much to offer each other during discussions. When a hunter in

When classes are over for the day, socializing in the game room adds zest to budding friendships.

the group argues with the agriculture teacher, each emerges from the fray with his own thinking stimulated and broadened!

During the last two days of the workshop each member of the group presents a project upon which he has been working independently. These projects may be for any one of the following purposes:

(1) To enrich the background knowledge of the teacher,
(2) To be used as a classroom presentation in his own school, or
(3) To be presented to his community for the value it may have in solving a local problem.

The presentations are usually very dissimilar. They may include experiments which illustrate a conservation practice, film strips, movies, or collections made by the student.

The workshop, by its very nature, encourages comradeship and lasting friendships among the members of the group. They have endured sun, heat, rain, ivy poison, and chigger-bites together, and so, on the last day sincere plans are made for future contacts. Over the years several successful reunions have been held—and interest in teaching conservation to the children of Pennsylvania is kept alive. All the classes have been enthusiastic about the course in spite of the long hours and rigorous schedule.

Because all teachers are eligible for this course, every grade level from kindergarten to senior high is likely to be represented. High school teacher groups often include librarians, supervising principals, and English teachers. For this reason the consultants have a job that is at least two-fold: (1) To provide scientific knowledge when it is needed, so that teachers without prior training can understant material presented and, (2) To show that every teacher can teach conservation in the classroom by correlating it with the subject being taught. First grade teachers may call it nature study, fifth grade has geography, and a high school English class needs topics for creative writing and research practice. The staff of the laboratory also seizes upon any opportunity to teach skills that science teachers can use. Classes which express the desire to learn such things as bird-banding techniques, aquarium and terrarium building, and specimen mounting have an opportunity to do so.

As the foregoing description indicates, this workshop represents a substantial financial outlay. Each student in the past has been awarded a scholarship which pays all university fees and some incidental expenses. These scholarships are provided by interested organizations such as sportsmen's clubs, garden clubs, education associations, women's clubs and private industries. The state conservation agencies contribute monies to help defray administration costs. The visiting faculty is provided by various departments of the university, and by state and federal agencies. Free teaching aids most of which are listed in the N.A.B.T. Conservation Handbook, are provided, so that each student has abundant resource material to take back to home classrooms.

A great deal of time is spent by the Director and a long-suffering secretary, in advance publicity, solicitation of scholarships, schedules, requests, confirmations, screening of applicants, and numerous other details. Plans must be made for housing, eating reservations, bus transportation, and health services. Letters of appreciation, handling of sudden schedule changes, and gathering of materials and supplies also falls on their broad shoulders.

The Commonwealth of Pennsylvania is making progress in all phases of conservation and is succeeding in the battle to sell conservation to the public. As our teachers, trained in conservation education, continue to enlighten the children in this state, so will we continue to wisely use the resources which we have so abundantly.

A workshop such as this could be used on a modified scale as an in-service training program for teachers in a local district. It is also adaptable for use with youngsters in a school camping situation. While reading this report you have no doubt been thinking about the many resource people you have in your own community and the field trip possibilities in your area. Conservation education is a must if we are to pass on to future generations the rich inheritance of resources we have.

ANALYZING PSYCHOTHERAPY, Solomon Katzenelbogen, 126 pp, $3.00, Philosophical Library, New York, New York, 1958.

This book is to acquaint the reader with the meaning, scope, and basic steps in psychological treatment by describing the vital concept of psychotherapy which guides the author's practice.

Biology and the Science Curriculum*

ELRA M. PALMER
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In this day and age of curriculum review and revision, it is disturbing to note that a number of people are advocating the teaching of biology in the junior high school as a part of general science (grades 7, 8, 9) and the offering of advanced biology courses in grades 10, 11 and/or 12. For many years biology has been the leading high school science. Statistics indicate that many more pupils take biology in the American high schools than take physics and chemistry combined. This is a significant fact, and I believe that this practice should continue.

The trend to force subject matter down into the lower grades appears to be a common one in many areas. I would agree that some of this is worthwhile, and, perhaps, some general introductory biology work should be given in the ninth grade followed by a sequence of biology units given in the tenth grade. I feel very strongly on this point because, as the compulsory school age has been raised, most pupils stay in school through the tenth grade. What more important information in the field of science can we give than the fundamental principles of the biological sciences?

I know that a physicist or chemist would argue this point, but if biology is still the "science of life," everyone must live and must live in a society with ever increasing problems.

I believe that opportunities should be provided in the eleventh or twelfth grade to elect at least a half year of advanced biology for those students who may plan careers in this field. This, however, should not be at the expense of eliminating biology as a required high school science. It is disturbing to note the increasing activity in the higher levels of professional groups which tends to cause further fragmentation among the science offerings. The suggestion is that two years of physics or chemistry be required of science majors.

You know as well as I do that this must be at the expense of other subjects. It is essential that a science major have a solid background of mathematics and English. All subjects cannot be left to be taught in the eleventh and twelfth grades. It is our responsibility as public educators to provide a well balanced and proportionate curriculum to meet the needs of all pupils who come to our schools. This means that we must meet the entire spectrum of ability, ranging from the slow learner to the gifted.

Biology is unique in that it is easily adaptable to the needs of pupils of varying ability. Perhaps one of our difficulties has been that we tend to give an anemic college course in systematic biology as though all of our pupils are college bound. Perhaps we should look more carefully at what we are teaching; how we are teaching; and to whom we are teaching it. To me, this is more important than juggling the curricula to the point where only selected pupils take high school biology.

Are we justified within the framework of the philosophy of the American high school to offer comparative anatomy or physiology? It seems to me that such courses are rightfully a part of the college curriculum and should remain so.

In the Baltimore public schools, we believe firmly that all pupils need a good foundation in the sciences whether these pupils are college bound or not, be they slow learners or not. *All* pupils in today's world need to develop some understanding and appreciation of the important contribution which science has made and is making to civilization. Science is, indeed, the highway on which civilization travels.

To this end, we have established a sequence whereby *all* pupils when they complete grade 10, will have acquired one and one-half years of physical science, one and one-half years of biological science and one year of health. This program is constructed as follows:

7th Grade
One half year—Health
One half year—Astronomy and Geology

8th Grade
Air and Water
Matter

*Presented at the NABT sessions of the AAAS in Washington, D. C., December, 1958.

Electricity
Mechanics

9th Grade
One half year–Health
One half year–Biology (6 units)

Unit I. Introductory unit
Unit II. Living things of the world
Unit III. Structure of organisms
Unit IV. Some simple forms of life
Unit V. Man's dependency on plants and animals
Unit VI. Relationship of living things to their environment

10th Grade
Biology (14 broad field units, some of which are based on ecology problems)

First Day Suggestions
What Does It Mean To Be Alive?
Chesapeake Bay
Insects and Human Welfare
How Do Complex Animals Maintain Themselves?
Reproduction
Heredity
The Biological Basis for Emergency Aid
Plant and Animal Behavior
Classification
Conservation
Consumer Biology
The Changing Drama of Life
How Does Biology Help Us To Appreciate Our Everyday World?

It is interesting to note that the more ability that the class has, the fewer units are taught. This is a result of more sustained interest on the part of these pupils. They delve more deeply into the problems. It is the teacher's responsibility to *uncover* subject matter rather than *cover* it.

For the purpose of this paper, I have considered biology only in relation to the secondary area.

The secondary school science program, however, is based upon a strong and rapidly expanding elementary program which includes an extensive development of the biological sciences.

In our basic curriculum, which is an attempt to provide for the slow learner (75-85 I.Q.), it is worthy of noting that the same amount of time and the same units in science are given; athough the method used and depth of units are considerably different from that offered the average student. You will be interested also to note that opportunities are provided both in enrichment and/or acceleration for students of superior abilities. Chemistry and physics are offered in the eleventh and/or twelfth grade, and provisions are being made at the present time to provide science majors with an opportunity to elect one half year of advanced science. This may be either biology, physics, or chemistry. Some of my colleagues look askance at the idea of one half year and ask, "Why not offer a full year of these advanced courses?" As a science educator, I feel that these superior students must also have an opportunity, if they plan to be science majors, to take at least one half year of advanced mathematics which you will agree is most essential in this scientific world.

In conclusion, may I suggest that those of us concerned with curriculum structure proceed with caution so that we will not lose the advantages which biology has and does enjoy. We should see that science is given time and its rightful place in any curriculum revision. We must give careful consideration to the maturation factors in children relative to our placement of biology, and we should look long and with real care at what and how we teach biology.

TEACHING SCIENCE IN THE SECONDARY SCHOOL, R. Will Burnett, 382 pp., $5.25, Rinehart and Co., Inc., New York, 1957.

The aim of this book is to present the theory and practice of science teaching on the secondary school level in an integrated fashion to help develop the theoretical insight and the practical knowledge and skill needed for high achievement in science teaching.

NATURAL HISTORY OF BIRDS: A GUIDE TO ORNITHOLOGY, Leonard W. Wing, 539 pp., $6.75, The Ronald Press Company, New York, 1956.

This book was written for people interested in birds wherever found or studied, planned as a general reference, and is in a sense a study of comparative bird biology focused on the life of the bird as a living thing.

Report of AAAS Cooperative Committee on Teaching of Science and Mathematics

BROTHER G. NICHOLAS, F.S.C.
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The fall meeting of the AAAS Cooperative Committee was held in Washington, November 14-15, 1958. The subcommittee on Teacher Certification and Accreditation distributed a draft of its "Recommendations for the Preparation of High School Science and Mathematics." This draft was reviewed line by line and a number of suggestions made for the consideration of the subcommittee. A revised draft has since been made into a final report. A condensation of the report, including the complete section dealing with the preparation of biology teachers, will be published in a future issue of the *ABT*. The complete report will be published in *School Science and Mathematics*, following the custom of reporting AAAS Cooperative Committee activities in this journal.

A report from the subcommittee on Improvement of College Teaching considered the merits of special doctorate programs designed for those whose primary interests are in teaching, rather than research, at the college level. Data is being collected on programs leading to such degrees which are believed by some educators to be more appropriate than the usual Ph.D. program for junior college teachers, general education personnel and teachers in the smaller four year colleges. Doubts were expressed by some members of the committee on the desirability of doctorate programs not substantially equivalent to the usual Ph.D. program in the sciences and mathematics on the grounds that such programs will tend to lower the standards for the preparation of college science teachers. On the other hand, the opinion was expressed that as a practical matter the availability of individuals trained in special doctorate programs for college teachers might improve the level of preparation of college science staffs since many colleges are forced to employ individuals trained at the master's level or lower because individuals with doctorates in science cannot be found for many existing openings.

A general discussion on the institute program of the National Science Foundation resulted in the opinion that these programs should be viewed as emergency programs to improve teachers now in service but that for the long run changes must occur in the undergraduate preparation of science teachers if these teachers are to be trained who will not need continued help of this sort.

The increasing interest in the expansion and improvement of science teaching in the elementary school led to the suggestion for the development of a list of science concepts appropriate for elementary education. It was pointed out that many such lists have been developed and that numerous courses of study for elementary science also exist. The root of the problem lies in the lack of appreciation by elementary school teachers of the objectives of elementary science instruction and of the skills and understandings which elementary school pupils may be expected to acquire as a result of their studies in science. The AAAS is considering sponsoring a conference on the training of elementary science teachers with special emphasis on pre-service education programs and the contribution to these programs by departments of science.

Announcement was made of the extension of the Science Teacher Improvement Program for another three year period. Proposed activities for this period are similar to the activities carried out during the past three years. In addition, provisions are being made for some experimental studies and at present the plans are to develop a study of the use of special teachers of science in grades 5 and 6 as one such activity. It is also hoped that cooperation can be obtained with a number of institutions of higher learning that are interested in developing experimental programs in teacher education in science and mathematics, with particular reference to professional education requirements and their relationship to the study of science and mathematics.

The spring meeting of the committee was held in Washington on March 20-21.

Letter to the Editor

One Ninth Grade Biology

The recent trend to fortify and to expand science education in the U. S. has resulted in a potpourri of proposals and recommendations. Many of the suggestions are concerned with providing an accelerated curricular track for the science-oriented, superior pupil. One such proposal, which has been implemented in a number of schools, is the substitution of biology in the ninth year for general science in the ninth year.

The reasoning that has motivated this change is that the superior pupils will thereby gain a year in which to take advanced, elective science courses. This, of course, requires that physics and chemistry ordinarily offered to the twelfth and eleventh year pupils respectively will now be moved down to the eleventh and tenth years. The reasoning is superficially attractive. We are interested in offering more science experiences to gifted pupils. This shift does seem to enable our desideratum to be achieved. However, the relegation of biology from the tenth year to the ninth year is a grave error for several reasons.

The present kind of biology that is taught is an historic outgrowth of the shift from the Nineteenth Century emphasis on taxonomy to the Twentieth Century emphasis on dynamic, functional biology. This shift is based upon the rapid and encompassing advances in the many sectors of physiology, biochemistry, and biophysics. Realistic tenth year biology syllabi have incorporated the spirit and appropriate content of these advances. A pupil in a biology class must have had adequate training in elementary chemistry and physics to comprehend the requisite concepts in biology. This background should be provided for superior pupils in a solid ninth year general science course enriched and bulwarked with suitable disciplines and content; e.g., a more systematic treatment of chemistry and physics.

The sequence of general science, biology, chemistry, and physics represent a basic skeletal articulation which has been tested and shown to parallel consonantly the maturity levels of the pupils. Ninth year pupils have not yet matured sufficiently to assimulate the subtle and complex relationships that have to be appreciated in the study of heredity, evolution, reproduction, and, among other subjects covered in tenth year biology, problems in behavior. Experienced teachers who have taught ninth and tenth year pupils know that the maturity saltation that occurs in that single year is dramatic and exceptionally significant in the education and growth of the pupils.

There is room for advanced elective courses in addition to the fundamental tetrad of general science, biology, chemistry, and physics. This is not a theoretical statement. Many of the pupils do take all these courses and advanced science as well. Schools that have adequate science personnel and adequate funds can provide advanced science courses. We do feel that advanced courses for gifted pupils are very desirable. But what is even more important is a sound and balanced diet of courses, enriched, challenging, vigorous, and concatenated. External acceleration may lead to adventitious learning; internal acceleration intensifies and strengthens learning because it is based upon the teacher's knowledge of the pupils' readiness to ascend the next educational peak.

The Biology Chairmen's Association of New York City is opposed to the idea of offering biology in the ninth year to superior pupils. The Association believes that this kind of change will solve no problems, but rather, that it will misdirect the thinking and energy of educators into unproductive channels. Our sights should be set on the continuous reformulation and reinforcement of our present curricular stratification and on the development of additional higher level elective courses for those pupils who have proven themselves to be ready for the advanced courses.

WILLIAM BERMAN

Chairman, Committee on Status of Biology, Biology Chairman's Association of New York City

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"Teachers' Guide for Bold Journey" is available from the American Broadcasting Company and the Ralston TV-Education Department, Box 339, Radio City Station, New York 19, New York. Biology and health teachers will find this a most valuable guide to the teaching of nutrition. It has been prepared to accompany the television program, "Bold Journey."

Biology in the News

Brother H. Charles, F.S.C.

THE WASTEFUL PHONY CRANK DIETING CRAZE, Ernest Havemann, *Life*, January 19, 1959, pp. 102-114.

Blitz methods of reducing are soon followed by regaining the lost poundage. This article discusses problems of adults but can be used effectively to stimulate teen agers to talk about their own reducing problems.

STRANGE CREATURES OF A LOST WORLD, Lincoln Barnett, *Life*, January 26, 1959, pp. 46-64.

A group of marvelous paintings of prehistoric life and diagrams of their possible evolution. Wonderful bulletin board material. You will want at least two copies for your permanent files.

DEATH FROM THE HOSPITAL NURSERY, Gladys Denny Schultz, *Ladies Home Journal*, February 1959, pp. 60-61, 178-180.

We have lived with staphlococcus germs for years. They caused infections but seldom caused death. Now a new virulent type has developed and is causing much trouble among hospital patients. Babies have little resistance to these germs.

HOW TO KEEP PETS HEALTHY, Judith Randal, *Redbook*, February 1959, pp. 52-53, 101-104.

Do you need some up-to-date information about diets and treatment of your dog, cat or parakeet? This article gives it along with what the veterinarian can do when your pet is ill. Also, good vocational reading for one who might want to become a veterinarian and specialize in small animals.

SHOULD YOUR CHILD'S TONSILS BE REMOVED? Harold Baron, *Redbook*, February 1959, pp. 46-49, 93-94.

To remove the tonsils or not is a difficult decision for even the most experienced physician. The article counsels learning the functions of the tonsils and relying on the doctor's opinion.

WHAT MAKES BASIC RESEARCH BASIC, Hans Selye, *Saturday Evening Post*, January 24, 1959, pp. 30-31, 78-80.

A wonderful account of what a research scientist does and the qualities he must have to succeed. This is interesting reading for anyone who wishes to know things.

LIVING WITH NATURE IN FLORIDA, Peter Lyon, *Holiday*, February 1959, pp. 56-57.

A casual observer describes how he found the correct answers to some of his false ideas. This article could stimulate the collection of false ideas about the plants and animals in your own locality.

HOW TO TIE FLIES, Tom McNally, *Outdoor Life*, February 1959, pp. 54-59, 112.

Step by step directions, with illustrations, of fly tying techniques. Excellent for the hobbyist who enjoys fishing.

WORLD'S BIGGEST BEAR, Tom Bolack, *Outdoor Life*, February 1959, pp. 40-41, 138-139, 146.

Is the polar bear the largest of bears? The author thinks so. This article contains much valuable information about the habits of bears and the country where polar bears live.

Monasteries or Honey-Combs?

I wish to offer to all present and future teachers, authors and publishers a correction. In reviewing six high school biology texts, I found five of the six credit the name "cell," assigned by Robert Hooke in his *Micrographia* to the empty chambers observed in thinly sliced cork, as being derived from their resemblance to the rows of cells in a monastery. My reading of both modern quotations as well as a microfilm of an original edition show that this is not true, and I offer the following quotation in evidence:

> "- - - - I could exceedingly plainly perceive it to be all perforated and porous, much like a honey-comb, but that the pores of it were not regular, yet it was not unlike a honey-comb - - - ."

ROBERT A. HODGE
James Monroe High School
Fredericksburg, Virginia

MICROBIOLOGY AND EPIDEMIOLOGY, La Verne Ruth Thompson, 581 pp., $6.00, W. B. Saunders Co., Phil., 1958.

A reference book which answers an important need for high school teachers who want information on microörganisms and disease, which is up-to-date, accurate, and not too technical. Most valuable is the author's ecological approach to the relationship between host and environment in causes of disease. The host, the parasite, and the environment are placed in proper perspective.

The book has good illustrations, is well documented, and presents the material in an interesting and stimulating manner. Pupils can get numerous ideas for independent scientific investigation by leafing through its pages.

Phyllis S. Busch

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THE CHANGING FACE OF NEW ENGLAND, Betty Flanders Thomson, 188 pp., $3.75, The MacMillan Company, New York, 1958.

Every New Englander should own a copy of this little book. Then when his innate smugness completely gets the best of him, he can take it out and read a chapter (I) to reconfirm his conviction that New England is one of the most beautiful regions of the earth and (II) to remind him of how wonderful it might be with wiser use of its natural resources. But this is not a book for New Englander's alone, nor is it merely another plea for more conservation. It is a sound background for the appreciation of landscape over a large part of the eastern United States and worthwhile reading for any teacher.

Betty Thomson was originally an Ohioan, who strayed east to school in Massachusetts and never returned. She says that she found that the New England hills on a clear winter day matched the intriguing but unknown "red-violet" of her childhood "construction paper." Obviously she found other enchantments in New England to judge from her descriptions which range from the majestic Green Mountains to the elfin wildflowers of Mt. Washington. Her book, however, is not simply a travelogue. There is a tremendous amount of background material in geology, ecology, botany, and history of land use which is presented in a lucid and readable form. Miss Thomson has achieved a rare union of clear and often beautiful prose with scientific accuracy. I only hope that she has plans for a similar volume on her native midwest.

FRANK N. YOUNG, Indiana University

GENETICS IN EASY. Goldstein, Philip. 238 pp. Tantern Press, Inc. New York 10, N. Y. $4.00. 1955.

Here is a text that is up-to-date, easily readable, and readily understandable. The information is accurate, yet simply stated. The technical aspects of heredity are presented in terms which any layman can read and enjoy. The book is amply illustrated which adds to the clear understanding of the text material. For information about the concepts of heredity, it should definitely be the first book read.

BIOGEOGRAPHY, An Ecological Perspective, Pierre Dansereau, 394 pp., $7.50, The Ronald Press Co., New York, New York, 1957.

This book is to provide senior and graduate students in the fields of plant and animal ecology and geography with a new synthesis of the environmental relationships of living organisms. There are 5 main sections: History of Biota, Bioclimatology, Synecology, Aulecology, Man's Impact on the Landscape. There are numerous pictures, diagrams, charts and graphs throughout the book and an extensive appendix at the end.

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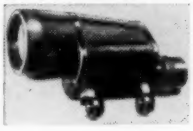

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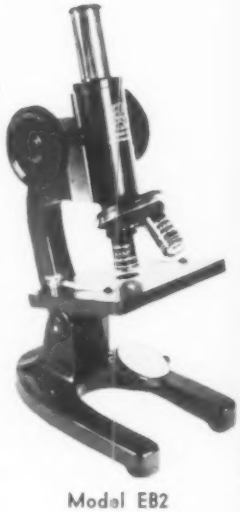

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